



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/428,125	10/26/1999	VISHNU K. AGARWAL	MI22-1299	4264

21567 7590 06/03/2004

WELLS ST. JOHN P.S.  
601 W. FIRST AVENUE, SUITE 1300  
SPOKANE, WA 99201

EXAMINER
----------

ROSE, KJESHA L

ART UNIT	PAPER NUMBER
----------	--------------

2822

DATE MAILED: 06/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/428,125

Applicant(s)

AGARWAL ET AL.

Examiner

Kiesha L. Rose

Art Unit

2822

-- Th MAILING DATE of this communication appears on th cov r sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) \_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 38,42,43,46-53 and 56-59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

This Office Action is in response to the amendment filed 28 April 2004.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 38, 42,43,46-48 and 51-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda et al. (U.S. Patent 6,143,597) in view of Fujii et al. (U.S. Patent 5,661,319)

Matsuda discloses a capacitor (Fig. 1d), which contains a lower electrode (2) and an upper electrode (4) with two dielectric layers (5,8) formed there between on an entire capacitor dielectric region consisting of essentially the composite of the two dielectric materials. The two dielectric layers are crystalline and since the dielectric layers are made from the same material they will have the characteristics that make the crystalline layers have a lateral shift in grain boundaries from one layer to the other with one of the dielectric layers has a thickness from 10% to 90% of the combined thickness. Matsuda discloses all of the limitations except for the dielectric materials to be of a titanate compound. Matsuda discloses all of the limitations except for the dielectric layers to be Ta<sub>2</sub>O<sub>5</sub>. Whereas Fujii discloses a capacitor (Fig. 1) with two dielectric layers formed of

Art Unit: 2822

Ta<sub>2</sub>O<sub>5</sub>. Instead of the dielectric layers being made both of titanate compounds they can both also be made of tantalum pentoxide. Having both of the dielectric layers made of tantalum pentoxide allows them to act as a diffusion barrier, which prevents the diffusion of silicon into the dielectric film. (Column 3, lines 47-53) Since Matsuda and Fujii are both from the same field of endeavor, the purpose disclosed by Fujii would have been recognized in the pertinent art of Matsuda. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the capacitor of Matsuda by incorporating two dielectric layers made of tantalum pentoxide to prevent the diffusion of silicon into the dielectric film as taught by Fujii.

Claims 49, 50 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda and Fujii as applied to claims 38 and 51 above, and further in view of Park et al. (U.S. Patent 5,780,115).

Matsuda and Fujii disclose all of the limitations except for one of the electrodes to comprise titanium nitride. Whereas Park discloses a capacitor (Fig. 3) that contains titanium nitride electrodes (15/19) with a dielectric layer (17) therebetween. The electrodes are made of titanium nitride in order to reduce the oxide grown between the electrode and dielectric layer therefore reducing the thickness of the dielectric material. (Column 1, lines 51-65) Since Matsuda, Fujii and Park are both from the same field of endeavor, the purpose disclosed by Park would have been recognized in the pertinent art of Matsuda and Fujii. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the capacitor of Matsuda and Fujii by incorporating one of the electrodes to be titanium nitride to reduce the oxide

grown between the electrode and dielectric layer therefore reducing the thickness of the dielectric material as taught by Park.

Claims 56 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda et al. in view of Roh (U.S. Patent 5,783,253).

Matsuda discloses a capacitor (Fig. 1d), which contains a lower electrode (2) and an upper electrode (4) with two dielectric layers (5,8) formed there between on an entire capacitor dielectric region consisting of essentially the composite of the two dielectric materials. The two dielectric layers are crystalline and since the dielectric layers are made from the same material they will have the characteristics that make the crystalline layers have a lateral shift in grain boundaries from one layer to the other with one of the dielectric layers has a thickness from 10% to 90% of the combined thickness.

Matsuda discloses all of the limitations except for the dielectric materials to be of a titanate compound. Whereas Roh discloses a capacitor (Fig. 1e), which contains a first electrode (4) and a second electrode (8) with two immediately juxtaposed and contacting barium strontium titanate (BST) dielectric layers (6, 7). The two dielectric constants are formed of BST because they consist of high dielectric constants, which improve the capacitor device. (Column 3, lines 1-3) Since Matsuda and Roh are both from the same field of endeavor, the purpose disclosed by Roh would have been recognized in the pertinent art of Matsuda. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the capacitor of Matsuda device by incorporating two dielectric layers made of a titanate compound

because it has a high dielectric constant which improves the capacitor device as taught by Roh.

Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda and Roh in view of Fujii et al. (U.S. Patent 5,661,319).

Matsuda and Roh disclose all of the limitations except for the dielectric layers to be Ta<sub>2</sub>O<sub>5</sub>. Whereas Fujii discloses a capacitor (Fig. 1) with two dielectric layers formed of Ta<sub>2</sub>O<sub>5</sub>. Instead of the dielectric layers being made both of titanate compounds they can both also be made of tantalum pentoxide. Having both of the dielectric layers made of tantalum pentoxide allows them to act as a diffusion barrier, which prevents the diffusion of silicon into the dielectric film. (Column 3, lines 47-53) Since Matsuda, Roh and Fujii are both from the same field of endeavor, the purpose disclosed by Fujii would have been recognized in the pertinent art of Matsuda and Roh. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the capacitor of Matsuda and Roh by incorporating two dielectric layers made of tantalum pentoxide to prevent the diffusion of silicon into the dielectric film as taught by Fujii.

Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda and Roh as applied to claim 56 above, and further in view of Park et al. (U.S. Patent 5,780,115).

Matsuda and Roh disclose all of the limitations except for one of the electrodes to comprise titanium nitride. Whereas Park discloses a capacitor (Fig. 3) that contains titanium nitride electrodes (15/19) with a dielectric layer (17) therebetween. The

Art Unit: 2822

electrodes are made of titanium nitride in order to reduce the oxide grown between the electrode and dielectric layer therefore reducing the thickness of the dielectric material. (Column 1, lines 51-65) Since Matsuda, Roh and Park are both from the same field of endeavor, the purpose disclosed by Park would have been recognized in the pertinent art of Matsuda and Roh. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the capacitor of Matsuda and Roh by incorporating one of the electrodes to be titanium nitride to reduce the oxide grown between the electrode and dielectric layer therefore reducing the thickness of the dielectric material as taught by Park.

### ***Response to Arguments***

Applicant's arguments filed 28 April 2004 have been fully considered but they are not persuasive. Referring to the argument of the Fujii reference dealing with the two dielectric layers, that the two dielectric layers are formed with different amounts of metal, that is true in regards to the dielectrics being made of BaSrTiO, but is not true for when the dielectrics are formed of Ta<sub>2</sub>O<sub>5</sub>, since it states that the dielectrics can be formed of other materials (Column 3, lines 40-42). Therefore the Fujii reference does disclose the claimed invention and the rejection stands.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiesha L. Rose whose telephone number is 703-605-4212. The examiner can normally be reached on M-F 8:30-6:00 off 2nd Monday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.



Application/Control Number: 09/428,125  
Art Unit: 2822

Page 8

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
KLR

  
**AMIR ZARABIAN**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**